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(54) **PRINT MEDIA PRESSURE PLATES**

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(51) **Int. Cl.**

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CPC ***B41J 11/0095*** (2013.01); ***B41J 11/005*** (2013.01); ***B41J 11/08*** (2013.01); ***B65H 5/36*** (2013.01); ***B65H 7/14*** (2013.01); *B65H 2404/611* (2013.01); *B65H 2553/44* (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

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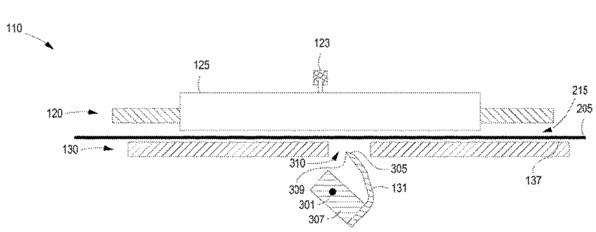
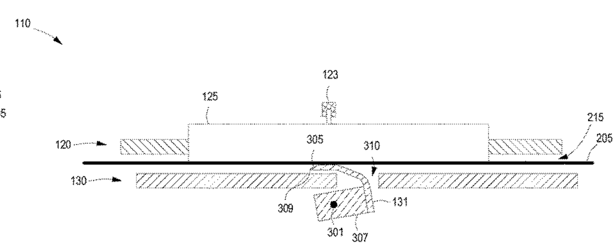
(57) **ABSTRACT**

Examples described herein include examples print media handling system including a first media guide assembly comprising a sensor assembly, and a second media guide assembly comprising a retractable pressure plate and disposed opposite the first media guide assembly to guide a print media along a path between the first media guide assembly and second media guide assembly, the pressure plate moveable about an axis perpendicular to the path between an actuated position and a retracted position.

16 Claims, 5 Drawing Sheets





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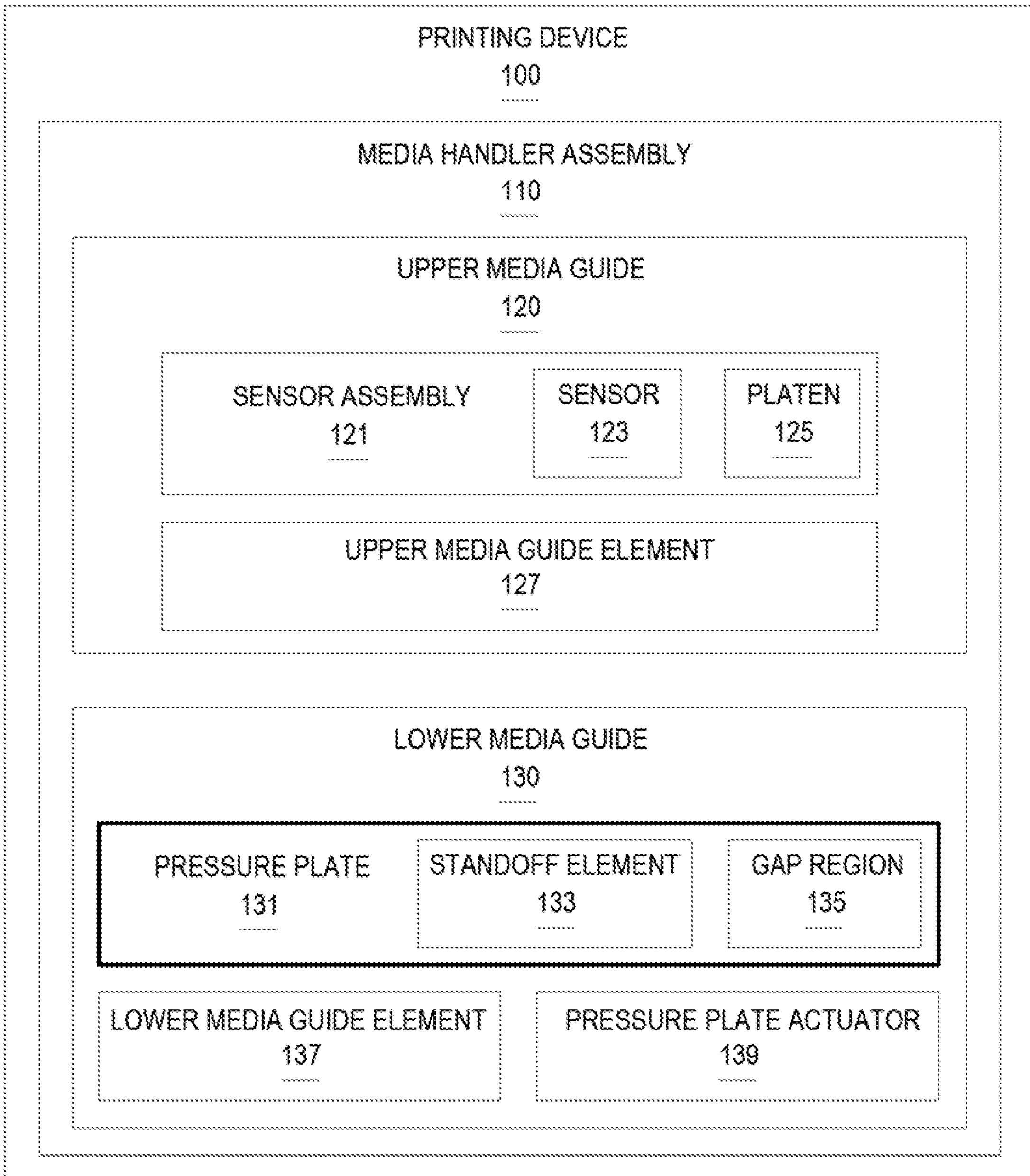
PRINTING DEVICE
100
MEDIA HANDLER ASSEMBLY
110
UPPER MEDIA GUIDE
120
SENSOR ASSEMBLY
121
SENSOR
123
PLATEN
125
UPPER MEDIA GUIDE ELEMENT
127
LOWER MEDIA GUIDE
130
PRESSURE PLATE
131
STANDOFF ELEMENT
133
GAP REGION
135
LOWER MEDIA GUIDE ELEMENT
137
PRESSURE PLATE ACTUATOR
139

FIG. 1

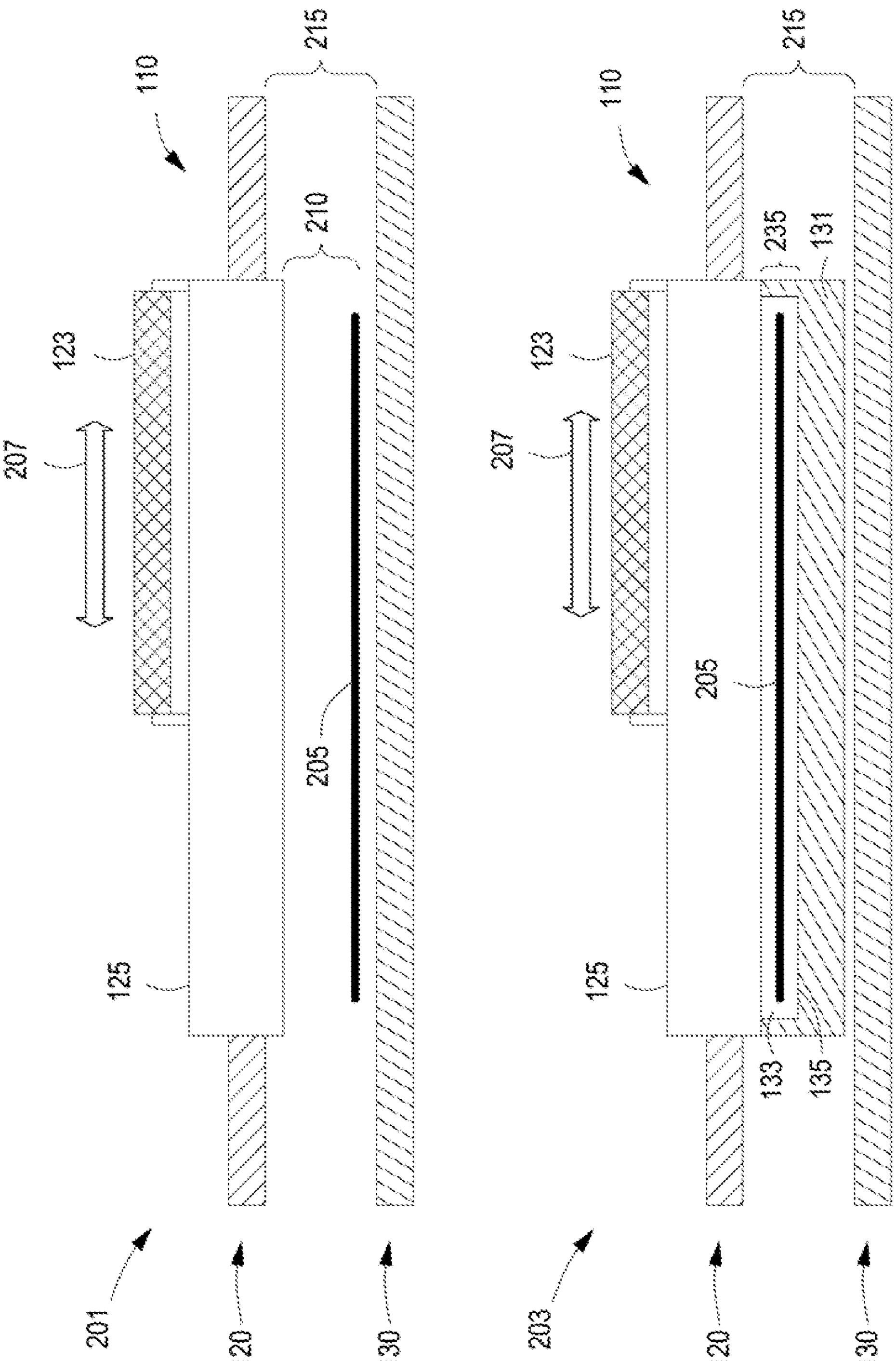
110
215
210
123
207
205
125
201
120
130
110
215
235
131
123
207
205
125
133
135
203
120
130

FIG. 2

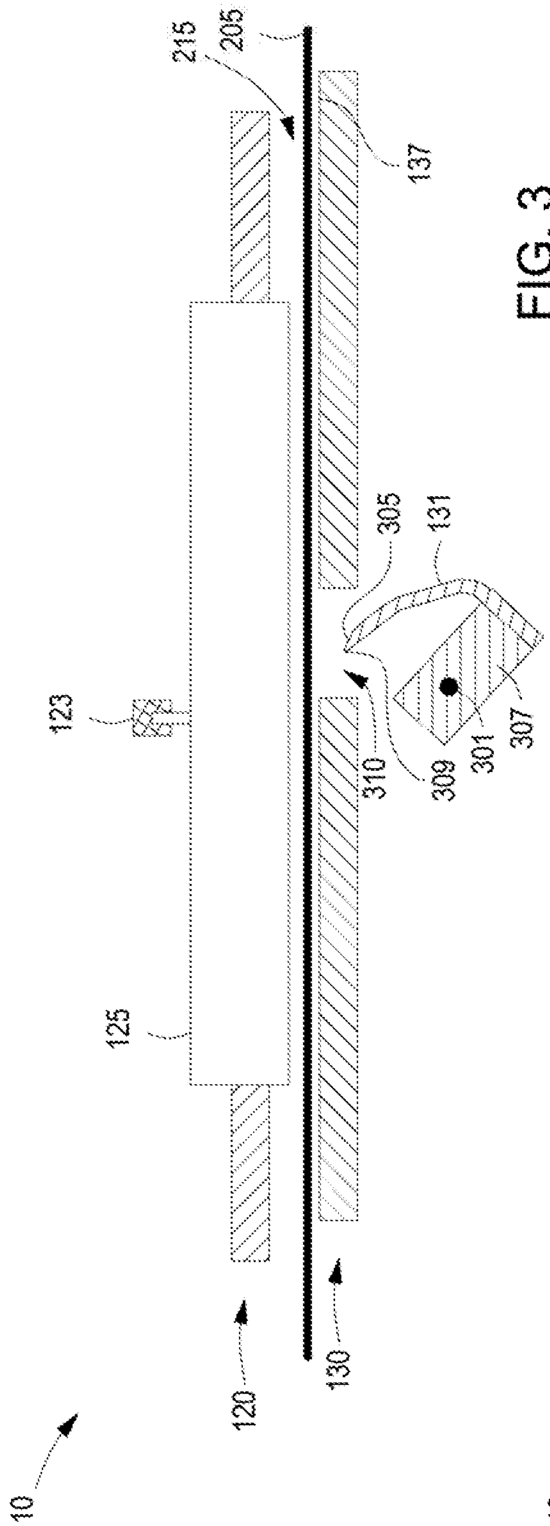
215
205
137
305
131
123
310
309
301
307
125
120
130
110

FIG. 3

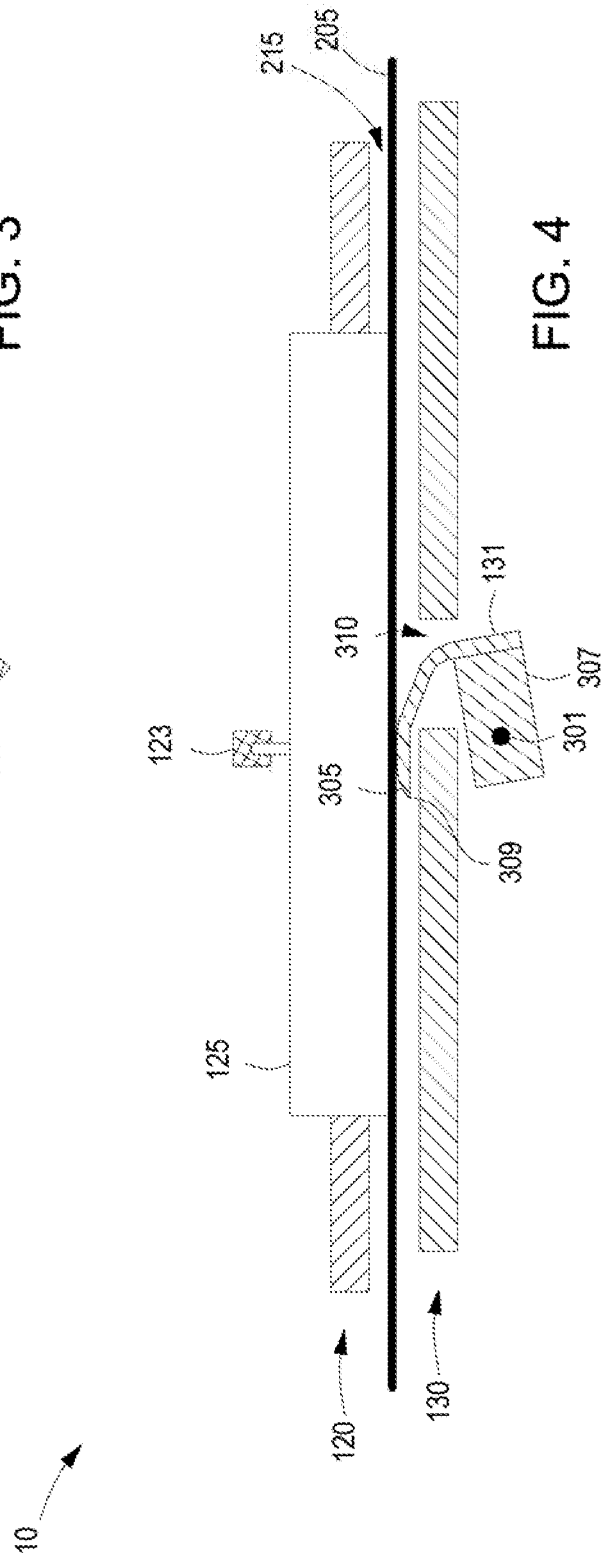
215
205
131
310
307
123
301
305
309
125
120
130
110

FIG. 4

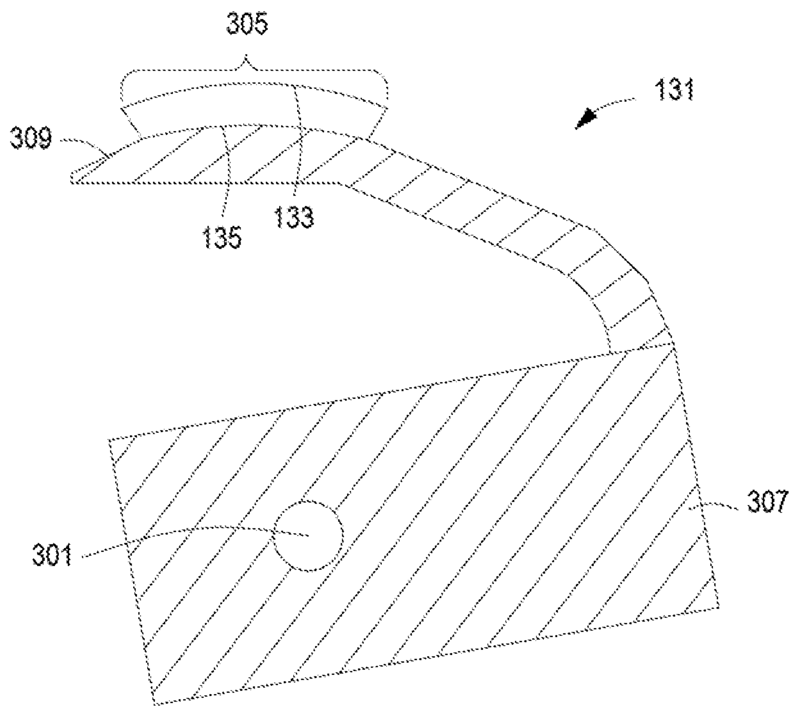

FIG. 5

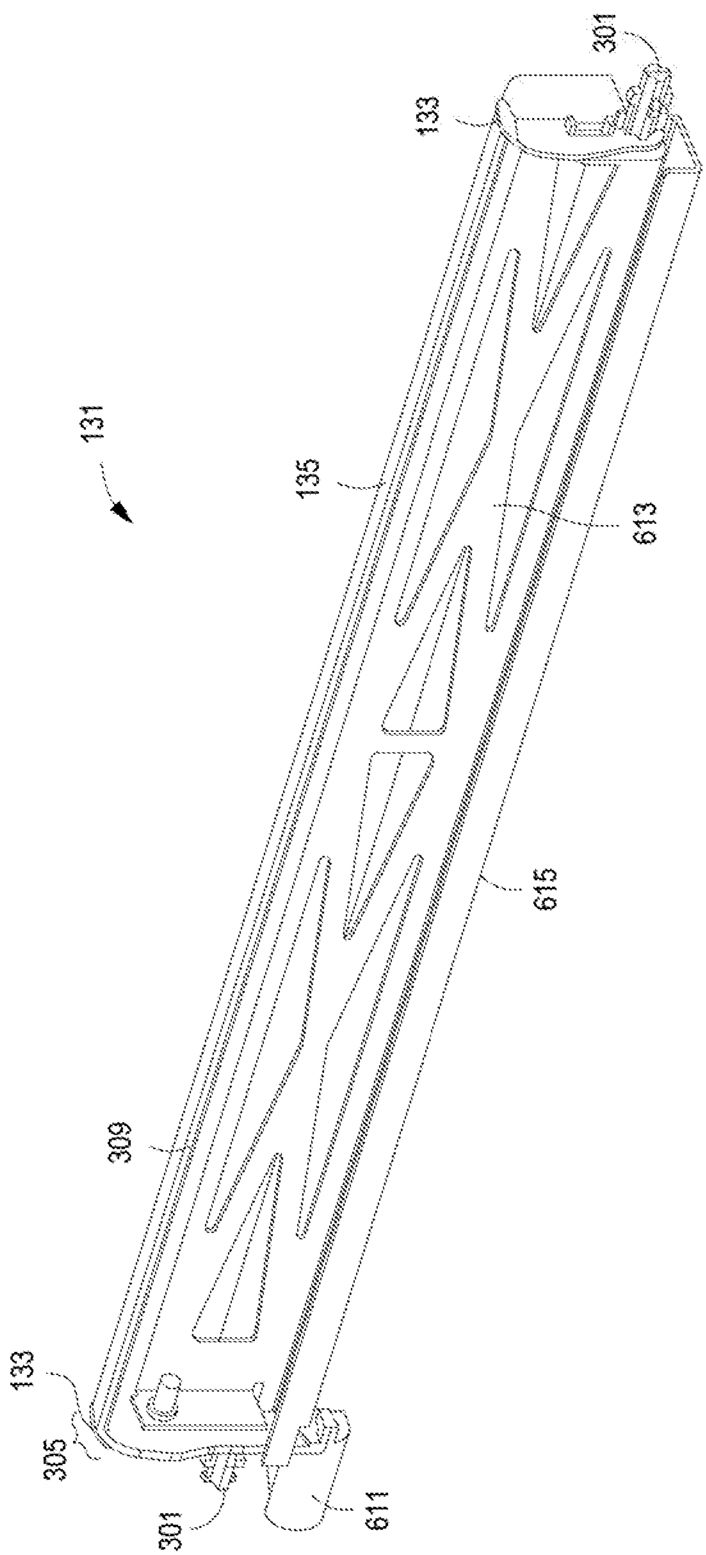

FIG. 6

PRINT MEDIA PRESSURE PLATES

BACKGROUND

Printing devices often include integrated sensors for sensing the position of print media, calibrating printing elements, or evaluating the performance of the various other components, such as the print elements and paper handling systems. Various types of sensors can be used. Pressure sensors, proximity sensors, magnetic sensors, optical sensors, and the like, can all be used to sense various conditions in the printing device. In some scenarios, a mechanical pressure sensor can be used to sense the presence of print media (e.g., a piece of paper or cardstock). In other applications, an optical sensor can be used to image, or otherwise detect, the quality of an image printed on a print media. For example, an optical sensor can be used to detect the physical or operational alignment of print nozzles or print heads, measure the fidelity of color reproductions, track variations of ink density, and the like.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** depicts an example printing device in which various aspects of the present disclosure can be implemented.

FIG. **2** depicts cross sectional views of an example print media handling system that includes a pressure plate in a retracted position and an actuated position.

FIG. **3** depicts a cross-sectional view of an example print media handling system with a pressure plate in a retracted position.

FIG. **4** depicts a cross-sectional view of an example print media handling system with a pressure plate in an actuated position.

FIG. **5** depicts a detailed cross-sectional view of an example pressure plate.

FIG. **6** illustrates a perspective view of an example pressure plate.

DETAILED DESCRIPTION

FIG. **1** depicts an example printing device **100** that includes various features according to the present disclosure. As shown, the printing device **100** can include, in addition to print engines, power components, user interface devices, and other components not depicted in FIG. **1**, a media handler assembly **110**. In various implementations, the media handler assembly **110** can include functionality and mechanisms for moving print media, such as paper, relative to the other components of the printing device **100**. For example, the media handler assembly **110** can include rollers for moving the print media along a particular media path and vacuum elements for holding the print media in place or flush against a particular surface to ensure proper alignment of a printed image. The media handler assembly **110** can thus include various print media guide elements that include, house, support, and/or contain components for guiding, transporting, aligning, sensing, and/or printing print media. For example, the print media guide elements can include services and rollers that define a particular media path through which print media is guided so as to be presented or exposed to various components of the printing device **100**.

In the particular example printing device **100** shown, the media handler assembly **110** can include a first, or upper, media guide **120** and a second, or lower, media guide **130**. In such implementations, the upper media guide **120** and the lower media guide **130** can include surfaces and/or rollers disposed relative to one another to define a particular print media path through which to guide the printing device **100**. In addition to the services and/or rollers, the upper media guide **120** and the lower media guide **130** can include components that the printing device **100** can activate or deploy to carry out specific media handling, printing, or sensing functionality.

In one example implementation, the upper media guide **120** can include a sensor assembly **121** and the upper media guide element **127**. The upper media guide element **127** can include surfaces, rails, vacuum elements, blower elements, rollers, and other elements for physically handling or guiding print media through the printing device **100**. The sensor assembly **121** can be disposed in or supported by the upper media guide element **127** in a position so as to sense or detect print media passing along the upper media guide element **127**.

For example, the upper media guide element **127** can support the platen **125** as part of the surface along which the print media moves. The platen **125** can include any material through which the sensor **123** can detect various features of the print media as it passes through the media path. For example, the platen **125** can include an optically clear or transparent window through which an optical sensor can detect the surface of the print media as it passes through the print media path. When detecting the surface of the print media, the optical sensor of the sensor **123** can detect surface defects, ink or images deposited on the surface, tears, rips, edges, etc. Accordingly, the sensor **123** can be used to detect features of a printed media that can be used to inform the operations of the printing device **100**. For example, sensor **123** can evaluate the density of ink dots deposit on the print media surface and/or evaluate the alignment of printed features. As such, information gathered by the sensor **123** can be used to provide initial calibration information, or detect malfunctions or defects in various printing mechanisms.

In some implementations, the sensor **123** can include an optical sensor. For example, the sensor **123** can include a single or an array of photodetectors that can detect differences in light levels reflected off the surface of the print media through the platen **125**. As such, in some example implementations, the sensor assembly **121** and/or the sensor **123** can include a light source for illuminating the surface of the print media through the platen **125**.

Optical sensors used in such implementations can have an associated working distance at which features printed on print media can be reliably or accurately detected. In some implementations, the working distance corresponds to the depth of field of any optical components associated with or included in the sensor **123**. Such optical components can include the platen **125** and/or lenses used to focus on objects (e.g. the surface of the print media) at the surface of the platen **125** or within some small distance therefrom. In such implementations, the working distance of the sensor **123** is referred to as the depth of field. The depth of field can refer to the distance from the sensor **123** and/or the platen **125** at which the sensor **123** can resolve features. In some implementations, the choice of optical sensor included in the sensor **123** can greatly influence the size of the depth of field. In particular, some optical sensors that can be selected have an shallow depth of field that requires that objects to be sensed by the sensor **123** be physically located within a small spatial region.

The scale of the depth of field of an optical sensor included in sensor **123** can be smaller than the gap between the upper media guide **120** and the lower media guide **130**. In particular, the spacing between the upper media guide element **127** or the platen **125** and the lower media guide element **137** may allow for print media to be located within acceptable tolerances relative to a print engine or rollers but be too far away from the surface of the platen **125** for the sensor **123** to accurately detect features printed thereon. Accordingly, in various implementations the present disclosure, the lower media guide **130** can include a retractable pressure plate **131**. In the interest of clarity and brevity, the "term retractable pressure plate" and "pressure plate" can be used interchangeably to refer to various implementations of the present disclosure that include the functionality of the pressure plate **131** described herein.

In various example implementations described herein, the pressure plate **131** can include a standoff element **133** and a gap region surface **135**. In scenarios in which print media is in the print media path and the sensor **123** is activated to detect features on the print media, it is possible for the pressure plate **131** to be actuated by the pressure plate actuator **139** to move the print media away from the lower print guide element **137** and towards the platen **125** and/or sensor **123**.

In such implementations, the pressure plate **131** can be actuated from a retracted position within the lower media guide **130** to be disposed such that the standoff element **133** is in contact with the platen **125** and/or the upper media guide element **127** to place the gap region surface **135** at a set distance from the sensor **123** and/or platen **125**. As such, the gap region surface **135** can maintained at a uniform gap or distance relative to the sensor assembly **121**. In various implementations described herein, the standoff element **133** can include multiple physical elements with a height offset from the gap region surface **135**. As such, when the pressure plate **131** is disposed in the actuated position by the pressure plate actuator **139**, the gap region surface **135** can be disposed at a distance from the sensor **123** and/or platen **125** at a working distance associate with the sensor assembly **121**. Example implementations of the pressure plate **131** are described in more detail below in reference to the FIGS. **2** through **6**.

FIG. **2** depicts two cross-sectional schematic views of example media handler assembly **110**. In view **201** the media handler assembly **110** is shown with the pressure plate **131** in a retracted position (e.g., hidden from view below the surface of the lower media guide **130**). In view **203**, the media handler assembly **110** is shown with the pressure plate **131** in an actuated position.

In view **201**, the print media **205** is passing through the print media path **215** defined between the upper media guide **120** and lower media guide **130** in a direction perpendicular to the page (e.g., the print media is traveling in or out of the page). As shown, the upper media guide **120** can support or include elements of the sensor assembly **121**, such as the platen **125** and the sensor **123**. In some implementations, the sensor **123** can move in directions indicated by arrow **207** to scan across the width of the platen **125** to detect, sense, or image the entirety or portion of the print media **205**.

As shown, when the pressure plate **131** is in the retracted position of view **201**, the print media **205** can be disposed at a distance **210** from the surface of the platen **125** and a corresponding distance from the sensor **123**. As described herein, the distance of **210** at which the print media **205** travels through the print media path **215** can be outside of the working distance or depth of field of the sensor **123** during normal operation of the printing device **100** that includes the media handler assembly **110**. In various implementations, the term normal operation refers to any operation in which print media **205** is moved through the print media path **215** for processing. Such processing can include printing, drying, creasing, stapling, and the like. For example, the print media **205** can travel through the print media path **215** at a distance **210** corresponding to an acceptable distance from a print engine (e.g., an inkjet print head, nozzle, sprayer, etc.) to generate the printed image having an acceptable print quality.

The distance **210** between the print media **205** and the platen **125** and/or sensor **123** maintained in the print media path **215** during normal operation may be too distant from the platen **125** and/or the sensor **123**. For example, at a distance **210**, the print media **205** may be beyond the depth of field of an optical sensor included in the sensor **123**. To move or press the print media **205** closer to the platen **125** and/or sensor **123**, the pressure plate **131** can be actuated.

In view **203**, the pressure plate **131** is shown in the actuated position. In the actuated position, the pressure plate **131** can press or position the media **205** within a distance of **235** of the platen **125** and a corresponding distance from the sensor **123**. As illustrated, the distance **235** depicted in view **203** is shorter than the distance **210** depicted in view **201**.

To maintain the print media **205** at distances less than or equal to distance **235**, the pressure plate **131** can include a gap region surface **135** held at the appropriate distance from the platen **125** by standoff elements **133**. As shown, the standoff elements **133** can be dimensioned to make contact with the surface of the platen **125** so that the gap region surface **135** is maintained at a distance **235**.

FIG. **3** depicts a cross-sectional side view of the media handler assembly **110** with the pressure plate **131** in the retracted position, according to various examples of the present disclosure. While in the retracted position, the pressure plate **131** can be disposed below the lower media guide element **137**. For example, as shown, the protruding end **309** of the pressure plate **131** can be disposed below the top surface of the lower media guide element **137** of the lower media guide **130**. In the particular example shown, the protruding end **309** can be disposed in or below the gap **310** located in the lower media guide **130**. As such, in the retracted position, none of the components of the pressure plate **131** interfere with the travel of print media **205** along the print media path **215**.

In one particular example, the protruding end **309**, which can include a curved region **305**, of the pressure plate **131** can be arranged in the retracted position by rotating the actuator element **307** about pivot point **301**. The curved region **305** can include a standoff elements **133** and gap region surface **135**. In one example implementation, both the standoff elements **133** and the gap region surface **135** can include corresponding curved profiles. The curved profiles can have corresponding radii originating from a common center. As such, when the curved region **305** of the pressure plate **131** is disposed against the surface of the platen **125**, the standoff elements **133** will ensure that the curved gap region surface **135** is at the same distance from the platen **125** when the pressure plate **131** is rotated into the actuated position shown in FIG. **4**.

In various implementations, the pressure plate **131** can be rotated into the actuated position by rotating the actuator element **307** about the pivot point **301**. Rotating the pressure plate **131** into the actuated position causes the protruding end **309** to passes through the opening **310** and into the print media path **215**. In the actuated position, the curved region **305** makes contact with the surface of the platen **125** at the distal surface of the standoff elements **133** to dispose of the gap region surface **135** at a distance **235** from the surface of the platen. While in the actuated position, the pressure plate **131** causes the print media **205** to pass through the augmented print media path between the gap region surface **135** and the platen **125**. As described herein, when the print media **205** is pressed toward the platen **125** by the gap region surface **135**, the print media **205** is positioned within the depth of field or working distance of the sensor **123**.

FIG. **5** depicts a detailed cross-sectional view of the pressure plate **131**. As depicted, the protruding end **309** can be coupled to the actuator element **307**. Accordingly when the actuator element **307** rotates about the pivot point **301**, the protruding end **309** and curved region **305** can move relative to the other elements in the media handler assembly **110** and/or printing device **100**. As described herein, the protruding end **309** and the curved region **305** can be moved through an opening **310** in a lower media guide **130**. While not shown in the accompanying figures, the opening **310** can include a protection element, such as a door or hatch, to block the opening **310** so as to protect the gap region surface **135** when the pressure plate **131** is disposed in the retracted position. Protecting the gap region surface **135** can help ensure that the surface remains free from contamination and damage (e.g., ink overspray, dust, scratch marks, smudges, and the like) when other elements of the printing device **110** and/or the media handler assembly **110** are operating.

In some implementations, the pressure plate **131** can be formed of a single material. In such implementations, the pressure plate **131** can include an injection moldable material such as plastic, vinyl, polycarbonate, and the like. In other example implementations, the actuator element **307** and portions of the protruding end **309** can include a composite of different materials and structures to provide rigidity, strength, and particular optical characteristics for the pressure plate **131**. For example, the actuator element **307** and the protruding end **309** can be made of a machined piece of metal that include various structural features to provide flatness and rigidity to a piece of white or gray material used to build up the curved region **305**. For example, the gap region surface **135** and the standoff elements **133** in the curved region **305** can include a white or otherwise opaque or reflective plastic material with which to back a print media **205** while it is being detected, scanned, or imaged by the sensor **123**.

FIG. **6** depicts a perspective view of an example implementation of the pressure plate **131**. The view depicted in FIG. **6** illustrates various structural elements that can be used to support and move the curved region **305** and its component gap region surface **135** and standoff elements **133**. For example, the example pressure plate **131** depicts the curved region **305** as extending from one end to another end of a beam **615**. In some implementations, the length of the curved region **305** from one end of the beam **615** to the other can correspond to the width of a page wide array print engine and/or sensor **123**. As such, the standoff elements **133** may only make contact with a corresponding platen **125** at the ends of the gap region surface **135**. To help ensure that the gap region surface **135** is flat and remains at a constant or relatively constant distance from the platen **125** or sensor **123**, the pressure plate **131** can include cross member structural elements **613** to provide sufficient rigidity and support. Accordingly, when the example actuator element **611** is moved or pivoted about the pivot point **301**, the curved region **305**, including the standoff elements **133** and the gap region surface **135**, also moved or pivot about the pivot point **301**. In this manner, the curved region **305** of the pressure plate **131** can be moved between the retracted position and the actuated position depending on the needs of the printing device **100** and/or the media handler assembly **110** to scan, calibrate, or adjust the operations of other elements of the printing device **100**.

These and other variations, modifications, additions, and improvements may fall within the scope of the appended claims(s). As used in the description herein and throughout the claims that follow, "a", "an", and "the" includes plural references unless the context clearly dictates otherwise. Also, as used in the description herein and throughout the claims that follow, the meaning of "in" includes "in" and "on" unless the context clearly dictates otherwise. All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the elements of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or elements are mutually exclusive.

What is claimed is:

1. A print media handling system comprising:

a first media guide assembly supporting a platen and comprising a sensor assembly; and

a second media guide assembly comprising a retractable pressure plate and a media guide element and disposed opposite the first media guide assembly to guide a print media along a print media path between the first media guide assembly and second media guide assembly, the pressure plate actuatable about an axis perpendicular to the print media path between an extended position and a retracted positioned,

wherein in the retracted position media advances along the print media path and past the pressure plate during printing on the media and the media is a first distance away from the platen corresponding to a distance from a print engine at which the print engine generates a printed image on the media at a specified print quality,

wherein in the extended position the media advances along the print media path and past the pressure plate during optical scanning of the media and the media is a second distance away from the platen that is less than the first distance,

wherein the pressure plate comprises a standoff that contacts the platen in the extended position while media advances past the standoff,

and wherein the media guide element of the second media guide assembly remains stationary relative to the platen of the first media guide assembly during movement of the pressure plate between the extended and retracted positions.

2. The system of claim **1** wherein the sensor comprises an optical sensor, and the pressure plate when in the extended position, is disposed transverse to the print media path to press the print media toward the optical sensor.

3. The system of claim **2** wherein the pressure plate further comprises a gap region surface, the standoff to physically register against the platen to position the gap region surface within a depth of field of the optical sensor.

4. The system of claim **1** wherein the standoff element comprises a first semicircular profile and the gap region surface comprises a second semicircular profile concentric with the first semicircular profile.

5. The system of claim **1** wherein the pressure plate when in the retracted position is out of the print media path.

6. The system of claim **5** further comprising a protection element to shield the pressure plate while in the retracted position.

7. The system of claim **1** wherein the pressure plate comprises an opaque or reflective material.

8. A printer comprising:

a first media guide assembly supporting a platen;

a second media guide assembly comprising a retractable pressure plate and a media guide element and disposed opposite the first media guide assembly to define a print media path in a first gap between the first media guide assembly and second media guide assembly, the pressure plate actuatable about an axis perpendicular to the path between an extended position and a retracted position;

a print engine disposed along the print media path to print on media while the media advances along the print media path and past the pressure plate in the retracted position of the pressure plate in which the media is a first distance away from the platen corresponding to a distance from the print engine at which the print engine generates a printed image on the media at a specified print quality; and

a sensor assembly disposed downstream the print media path relative to the print engine to scan the media while the media advances along the print media path and past the pressure plate in the extended position of the pressure plate in which the media is a second distance away from the platen that is less than the first distance,

wherein the pressure plate comprises a standoff that contacts the platen in the extended position while media advances past the standoff,

and wherein the media guide element of the second media guide assembly remains stationary relative to the platen of the first media guide assembly during movement of the pressure plate between the extended and retracted positions.

9. The printer of claim **8**, wherein, in the extended position, the pressure plate defines a second gap between the pressure plate and the sensor assembly having, wherein the second gap is narrower than the first gap.

10. The printer of claim **8**, wherein the second media guide assembly further comprises a protection element, and, when in the retracted position, the pressure plate is protected from the print engine by the protection element.

11. The printer of claim **8**, wherein the pressure plate comprises a curved surface to press a print medium against the sensor assembly, the curved surface comprising a radius centered on an axis transverse to the print media path.

12. The printer of claim **11**, wherein the standoff is disposed at an end of the curved surface to maintain a uniform gap between the curved surface and the sensor assembly when the pressure plate is in the extended position.

13. The printer of claim **12**, wherein a dimension of the uniform gap corresponds to a working distance of the sensor assembly.

14. The printer of claim **8**, wherein the sensor assembly comprises an optical sensor and the standoff has a height corresponding to a depth of field of the optical sensor.

15. The printer of claim **8**, wherein the pressure plate comprises a white or gray tone plastic material.

16. The printer of claim **8**, wherein the standoff is a first standoff, the pressure plate further comprises a second standoff and a cavity between the first and second standoffs, and the media advances within the cavity in the extended position of the pressure plate.

* * * * *